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Teaching universal design: an empirical research in interior architecture

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Abstract

Design studios are the essential part of the architectural education. Therefore, it is important to introduce big ideas and focus on complex concepts, such as universal design, within the challenge of design studios. This study is designed to provide a basis for further investigation on the possible adaptation of universal design philosophy in the Department of Interior Architecture and Environmental Design at Bilkent University beginning from the early stages of its design education to its graduate level. It is based on the data of an empirical research through semi-structured interviews with 79 interior architecture students and 23 full-time instructors. The results of the interviews revealed several influences on both students' and instructors' approach to universal design. From instructors' point of view, providing the linkage between the content of the courses in terms of universal design issues can be a good way to foster the development of innovative teaching strategies. According to students, it is important to emphasize on universal design issues as a fundamental aspect of design studios and lectures. Therefore, the in-depth treatment of universal design within the curriculum content is essential so that universal design becomes an inseparable part of the design process and a fundamental aspect of design education.

Keywords: universal design, design education, studio, human diversity, architecture

1. Introduction

The term universal design was first used in 1970's and reinterpreted by the American architect Ronald Mace in 1985 (Ostroff, 2001). Since then, universal design has been widely accepted and expressed all over the world, which is also known as, 'inclusive design' and 'design for all' (Story, Mueller & Mace, 1998). In 1988, Mace defined it as an approach for creating products and built environments accessible, usable and understandable for everyone (Preiser, 2001). Mace, Hardie & Place (1991) described universal design as follows: "It includes not just people in wheelchairs, but also people with mobility impairments, speech and hearing impairments, cognitive impairments, and with other inabilities that can be occurred over a person's life span" (p. 5). The Centre for Universal Design states that "universal design is the best way to integrate access for everyone into any effort to serve people well in any field" (Story, Mueller & Mace, 1998, p. 127). The history of universal design teaching began with the attention to users' needs in design schools in 1960s and 1970s (Welch & Jones, 2001). "The development of universal design

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education is intricately intertwined with the evolution of universal design as a concept for a more equitable world and as a value of designing places" (Welch & Jones, 2001, pp. 51.3- 51.4). In this respect, there are design efforts in the US and in some European countries including the UK in order to enhance new curriculum materials integrating universal design values into the design courses of five disciplines; architecture, industrial design, interior design, landscape architecture and urban design (Welch, 1995; Kenning & Ryhl, 2002; Preiser, 2003). Each project with different teaching opportunities was developed regarding the appropriateness of schools' curriculums. Design studios are the essential part of the architectural education. Therefore, it is important to introduce big ideas and focus on complex concepts, such as universal design, within the challenge of design studios (Burke, Hagan & Grossen, 1998). Reviewing the literature showed that educators have developed various projects varied in scale and function (Welch & Jones, 2001). Each of these projects has been taught at different levels (Welch & Jones, 2001). However, determining the best way to introduce universal design values into the curriculum requires also an essential consideration of the students' points of view and their active involvement. Their attitudes toward universal design and ability to incorporate it into the design projects become important. Thus, it is significant to state that students in all schools of architecture, interior design, landscape architecture and urban design should become aware of the values, concepts and philosophy of universal design at every level of their education program, beginning from the early stages of design education to the graduate and also post-graduate level (Preiser, 2003). Different than the teaching strategies both in the US and Europe where the students have not engaged universal design values before, this study focuses on the curriculum of the Department of Interior Architecture and Environmental Design at Bilkent University, where there have been already two undergraduate courses on universal design.

2. Aims and Objectives

The main research problem is exploring both students' and instructors' attitudes toward universal design. This study deals with analyzing two important issues related to the curricular response of the Department of Interior Architecture and Environmental Design. One issue is to explore how students experience and perceive universal design values and human diversity. Second issue is to investigate the possibilities of the department's curriculum to enhance universal design education considering the structure and content of the courses. The following six hypotheses are designed in order to test the relevant issues:

- Hypothesis 1: Students are able to integrate universal design issues into the given design problems.
- Hypothesis 2: Students consider that universal design principles limit their design solutions.
- Hypothesis 3: Universal design is one of the important concerns for instructors in the evaluation of a design project.
- Hypothesis 4: Instructors give importance to universal design issues within the structure and content of their course syllabus.
- Hypothesis 5: Both students and instructors are aware of the importance of universal design in both technical courses and design studios.
- Hypothesis 6: Students' attitude toward universal design education show similarities with the instructors' attitudes.

Considering these hypotheses it should be noted that the current study is designed to provide a basis for further investigation on the possible adaptation of universal design philosophy in the Department of Interior Architecture and Environmental Design. Testing these hypotheses can be also considered as an exploratory analysis of assessing the extent to which the students consider the diverse needs of people while they are designing and to which the instructors consider the requirements of universal design in their lectures and design studios.

3. Methodology

The study conducted qualitative and quantitative analyses to test the above hypotheses. The main concern is to point out the importance of universal design in educational environments from the perspective of students and

instructors and to develop an inclusive approach that helps to create accessible, affordable and adjustable environments.

3.1. Setting of the Research and Sample Group

The research is conducted with fourth year undergraduate students in Interior Architecture and Environmental Design at Bilkent University. This department is selected for several reasons. First, there are already two seminar courses on universal design in the curriculum; in the second year called 'Human Factors' and in the fourth year called 'Current Issues in Interior Design: Universal Design' (See Online Academic Catalog, 2004). Second reason is that as the university has well established design departments, further research can be conducted with the Communication and Design Department, Fine Arts, Graphic Design, Landscape Architecture and Urban Design.

3.2. Procedure

A survey in the form of two semi-structured interviews was carried out with 23 full-time instructors and 79 fourth year students. In the instructors' interview four stages were defined: (i) instructors' background and educational concerns (ii) their familiarity of universal design and the appropriateness of their course contents for teaching it (iii) their approach to develop assignments, projects, workshops and field trips related to universal design and (iv) their attitude toward the integration of universal design into the entire curriculum. Students were interviewed during their design studio hours and observed whether they are able to integrate universal design concepts into the given problem. The questions of the students' interview were also organized in four stages: (i) the students' approach without universal design in mind (ii) their familiarity to universal design (iii) their ability to integrate it into given problem (iv) their attitude to universal design education.

3.3. Variables

There are student-bound variables, instructor-bound variables and both student and instructor-bound variables. The Grade Point Average (GPA) of students, their success in the design studio, their awareness of universal design, their ability to integrate universal design into the given problems and their universal design knowledge were defined as student-bound independent variables. The specialization area of instructors, their awareness of universal design and their attitudes toward universal design education during juries and lectures are defined as instructor-bound independent variables.

4. Results

The data was analyzed with SPSS. Frequency distributions, cross tabulations, chi-square test and t-test were used to test the hypotheses.

4.1. Students' Attitudes toward Universal Design

Students' success level is analyzed regarding their GPA and design studio grade. A student's performance is determined at the end of each semester by computing an average of the grades that he/she has received during that semester. In the study, high GPA means aGPA between 4, 00 and 2, 00 and low GPA is the GPA, which are equal or low 2, 00. Undergraduate students who receive a C (Grade> 2, 00/ 4, 00) or a higher grade are considered to be completed that course satisfactorily. Thus, the study defined these students as successful and the other students, who receive below C (Grade< 2, 00), are considered as unsuccessful. The study also examined whether the students with higher GPA have higher success levels in the design studio. The effect of these two variables is important in terms of understanding how many successful students are also successful in the design studio. All of the unsuccessful students in the design studio have lower GPA. The students, who are successful within the design studio, have also higher GPA. There is a statistically significant relationship between GPA and studio design grade (x^2= 22,091, df=1,

α = 0, 01, two-tailed). Considering the students' success in design studios, the study also investigated the relationship between the students' grade level and their awareness of universal design. In order to test the hypothesis 1, students' design considerations are compared with their ability to integrate universal design values into the given design problems. Most of the successful students are aware of the universal design. 19 students emphasized the importance of the user diversity and stated that they enjoyed learning universal design. On the other hand, unsuccessful students have different levels of understanding of universal design. 22 of the unsuccessful students are only aware of people in wheelchairs and defined universal design in relation to one disability type whereas 34 of them are unaware of universal design values (See Table 1). There is also statistically significant relationship between the students' awareness and their success level (x^2= 12,258, df=1, α = 0, 01, two-tailed).

It is enjoyable to explore the needs of elderly, children and disabled people and to get contact with them while designing. Their diverse needs make my design richer (Student, # 5).

Table 1. The relationship between students' official grade level and their awareness of universal design

	Student awareness of universal design		
Student GPA	**Aware**	**Unaware**	**Total**
Successful	19	4	23
Unsuccessful	22	34	56
Total	41	38	79

In this context, the study explored the effect of students' awareness of universal design on their ability to integrate it within a given design problem. During the interviews 46 students have reported that they are taking universal design into consideration only if it is required by the instructors within the given design problem (See Table 2). It is also supported by the statistical analysis indicating that there is no statistically significant relationship between students' success in the design studio and their ability to integrate universal design issues into the given design problem.

I give emphasis on the concept of my design. I do not consider too much the diverse users needs. If only it is required in the project briefing by the instructors (Student, # 55).

Table 2. The relationship between students' design success and their ability to incorporate universal design.

	The ability to incorporate universal design		
Design success	**Able**	**Unable**	**Total**
Successful	25	22	47
Unsuccessful	8	24	32
Total	33	46	79

Students' ability to incorporate universal design is not affected by the success whereas affected by the awareness. There is a statistically significant relationship between the students' awareness and their ability to incorporate universal design into the design solutions (x^2= 52,527, df=1, α = 0, 01, two-tailed). All of the aware students commented that they are aware of the technical knowledge and the concepts of accessibility, usability and understand-ability. On the other hand, it was shown that most of the unaware students design built environments according to the requirements of an average person. In this respect, the analyses related to the student awareness are significant in terms of exploring how students experience and perceive universal design within the requirements of a design problem. The study indicates that their awareness is the key issue to engage with universal design. In order to search the reasons of not integrating universal design while designing, the study also explored whether the students feel that universal design limits them. Considering hypothesis 2, a chi-square test was conducted and according to the results, universal design is a limiting factor for 46 students that prevent them from designing freely (Table 3).

Universal design hinders me to make level differences (Student, # 41).

Table 3. The relationship between students' attitude and their ability.

	Universal design limits design solutions		
The ability to incorporate universal design	**Not limit**	**Limit**	**Total**
Able	13	20	33
Unable	20	26	46
Total	33	46	79

33 students found universal design helpful and considered their universal design knowledge as an opportunity to enrich their design perspective. However, only 13 of them incorporate it into the given problems. In this sense, students' attitude toward the limitation doesn't affect their ability of incorporating universal design. There is no statistically significant relationship between these two variables.

I think it opens up new possibilities rather than limiting (Student, # 50).

It helped me to find innovative design solutions to make my design usable for all abilities rather than only people in wheelchairs (Student, # 11).

4.2. Instructors' Attitudes toward Universal Design

Instructors' awareness of universal design is analyzed in order to explore whether an instructors' awareness affects his/her attitude toward universal design (See Table 4). In terms of the awareness, it does not matter whether they are studio instructors' or not. All the instructors are aware of universal design. Main difference between the instructors is the way how they name universal design. 16 instructors are conscious of the concepts of accessibility and usability without using the terminology of universal design. They also focus on the changing user requirements as much as possible within the content of their lectures and studio projects. The remaining part uses the terminology as universal design. They know universal design and have an inclusive approach within the design education.

In studios, we are stressing on functions and adaptability of the spaces in relation to the changing functions depending on the changing requirements of users (Instructor, # 6).

Table 4. The frequency distribution for instructors' awareness of universal design.

	Frequency	**Percent**	**Valid Percent**	**Cumulative Percent**
Aware	16	69.6	69.6	69.6
Unaware	7	30.4	30.4	100
Total	23	100	100	

In this context, to test the hypothesis 3, the study investigated whether instructor awareness affects his/her attitude toward universal design as evaluation criteria in juries (Table 5). There is statistically significant relationship between instructors' awareness and their evaluation criteria (x^2= 7,740, df=1, α = 0, 01, two-tailed). In fact, universal design is an important criterion for all of the instructors in the final evaluation. However, they differ in terms of giving priorities to the universal design values. 10 of the aware instructors place strong emphasis on universal design while evaluating design projects.

While evaluating projects, students' awareness of universal design is an important criterion. Since the number of students, who are able to incorporate these values successfully, are limited, I encourage them as much as possible to design universally (Instructor, # 10).

I give strong emphasis on user-space relation, human dimensions and diversity of users during my design critics (Instructor, # 5).

On the other hand, both 6 of the aware instructors and 7 of the unaware instructors give importance on universal design only if it is stated in the project briefing as a requirement.

I criticize students' projects with respect to the requirements of the project brief. If universal design values are in the brief, then I emphasize them (Instructor, # 1).

Order, readability of the project and its coherence with the function are important factors to evaluate a design project. If these components are achieved successfully, then the other design considerations are the minor things to me (Instructor, # 4).

Table 5. Importance of universal design while evaluating design projects.

	Instructor awareness of universal design		
Importance of universal design	**Aware**	**Unaware**	**Total**
Important	10		10
Unimportant	6	7	13
Total	16	7	23

To test the hypothesis 4, the study explored the instructors' knowledge of universal design (Table 6). The statistical results showed that the instructors' attitude is statistically independent from the instructors' knowledge. Although 20 instructors have knowledge, only 7 of them give importance to universal design within the content of the lectures. There are two reasons. First is the time management, if they give so much importance on universal design, then they feel that they couldn't have enough time to teach other design issues. However, they stated that if they had time, they would consider integrating it. Second reason is that they do not want to give students too much requirements and limitations while assigning problems.

Table 6. The relationship between instructors' attitude and their knowledge.

Universal design integration in design education	**Know**	**Don't know**	**Know without naming it**	**Total**
Integrate	3		4	7
Not integrate	1	1	1	3
Integrate without naming it	6	2	5	13
Total	10	3	10	23

The chi-square was carried out to see whether instructors' awareness affect their approach to the necessity of universal design education. It is shown that the instructors' attitude toward universal design teaching does not depend on the instructors' awareness. Although 16 instructors are aware of universal design, their attitudes toward universal design differ. Only 3 of them considered universal design as an integrated part of design education from first year to fourth year. 12 of them mentioned that universal design should not be the main focus of design education, it is better to be a sub-theme combined with other important issues. They also stated that universal design can be integrated step by step. 8 of them do not consider universal design necessary and they mentioned that it can limit the students and force them to design spaces with standards and certain principles.

T-test was conducted to determine whether there is a significant difference between the awareness of the students and instructors. T-test showed that the attitudes toward universal design issues from the standpoint of students and instructors are not different. Both are aware. So, the coordination and communication between them could help to see universal design as an important and creative challenge. This comparison is also essential for further investigation on the possible adaptation of universal design philosophy in the department. Participating in a dialogue about the necessity of universal design in both technical courses and design studios can embrace universal design as a pedagogic vehicle. In this context, the Hypotheses 5 and 6 were supported by these T-test results.

5. Discussion

The results of the interviews revealed several influences on both students' and instructors' approach. First are the curriculum characteristics, which are related to the number of universal design courses, hours of lectures with additional seminars and workshops. Second is the student characteristics, which are related to their GPA, their knowledge level and awareness. Curriculum characteristics can be defined by the department and instructors whereas student characteristics can change from person to person. With regards to student characteristics, their ability to address universal design and their awareness of diversity is closely related with their success. In this respect, it is essential to design the general curriculum with reference to universal design philosophy in order to increase the number of successful students which means the number of aware students. The results also suggested that the unaware students are less likely to be engaged in studio projects, lectures and activities related to universal design concepts. Therefore, it is important to emphasize universal design as a fundamental aspect of design education.

The findings can be interpreted from two points of view. According to the instructor point of view, the project brief in design studios should include the requirements of universal design so that both the students and instructors can give emphasis on the diversity of users. Organizing workshops, seminars on universal design issues can have a positive effect on awareness. In this sense, the students' experiential participation can be more effective than classroom discussions. Second, the structure of courses can be defined in coordination with each other. Since, as the instructors reported, the students are not able to correlate the information gained in separate lectures. They need to be encouraged. Thus, providing the linkage between the content of the courses in terms of universal design issues could be a good way to foster the development of innovative teaching strategies. According to student point of view, the reasons of the unawareness are not related with student lack of knowledge. Although the unaware students do not consider universal design issues while they are designing, they are sensitive enough to the diverse user needs in the daily life. The reason of not using universal design principles in the educational context is the time limitation. One semester is not enough for both instructors and students to respond to the requirements of universal design and combining these requirements into design problems. Finally, the in-depth treatment of universal design within the curriculum content is essential so that universal design becomes an inseparable part of the design process and a fundamental aspect of design education.

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